

What is claimed is:

1. A method for fabricating a semiconductor device, the method comprising:

(a) sequentially stacking a lower dielectric layer and an upper dielectric layer on a semiconductor substrate;

5 (b) etching the upper dielectric layer, thereby forming dielectric layer patterns to form parallel damascene interconnections on the lower dielectric layer, each of the dielectric layer patterns having a first width;

(c) partially etching the lower dielectric layer between the dielectric layer patterns to form first contact holes, and etching upper parts of sidewalls of the dielectric layer patterns  
10 on both sides of the first contact holes so that the dielectric layer patterns have portions corresponding to a second width narrower than the first width;

(d) filling the first contact holes with a first conductive material to form first contact plugs, filling lower parts of spaces between the dielectric layer patterns with the first conductive material to form damascene interconnections on the first contact plugs and  
15 etching the dielectric layer patterns on the damascene interconnections so that only the portions of the dielectric layer patterns having the first width protrude above the damascene interconnections;

(e) covering the damascene interconnections with a mask layer and planarizing the mask layer until the top surfaces of the dielectric layer patterns remaining after (d) are  
20 exposed;

(f) selectively removing the remaining dielectric layer patterns and the lower dielectric layer under the remaining dielectric layer patterns uncovered by the mask layer to form second contact holes; and

(g) filling the second contact holes with a second conductive material to form second  
25 contact plugs therein.

2. The method of claim 1, wherein (d) comprises:

depositing the first conductive material to fill the first contact holes and spaces between the dielectric layer patterns; and

30 forming the damascene interconnections by recessing the first conductive material from the dielectric layer patterns, and concurrently performing an etch-back process on the resultant structure on which the first conductive material is deposited so that only the portions of the dielectric layer patterns having the first width protrude above the damascene interconnections.

3. The method of claim 1, wherein (d) comprises;

depositing the first conductive material to fill the first contact holes and spaces between the dielectric layer patterns;

5 forming the damascene interconnections by recessing the first conductive material from the dielectric layer patterns, and concurrently performing an etch-back process on the resultant structure on which the first conductive material is deposited so that the overall width of the dielectric layer patterns protruding above the damascene interconnections are reduced; and

10 etching the dielectric layer patterns having a reduced width so that only the portion of the dielectric layer patterns having the first width protrude above the damascene interconnections.

4. The method of claim 3, wherein etching the dielectric layer patterns

15 having a reduced width is performed using dry etching, wet etching, or plasma etching.

5. The method of claim 1, wherein the mask layer is formed of a material having an etch selectivity with respect to those of the upper dielectric layer and the lower dielectric layer.

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6. The method of claim 1, wherein the mask layer is formed of a nitride layer or an oxynitride layer, and the upper dielectric layer and the lower dielectric layer are formed of an oxide layer.

25 7. The method of claim 1, wherein an etch stopper is further formed between the lower dielectric layer and the upper dielectric layer.

8. The method of claim 1, wherein planarizing the mask layer is performed using an etch-back or a chemical mechanical polishing (CMP) process.

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9. A method for fabricating a semiconductor device, the method comprising:

(a) forming gate stacks comprising a gate dielectric layer, a gate conductive layer, a capping layer, and a gate spacer, and source and drain regions on a semiconductor substrate;

(b) covering a first oxide layer filling spaces between the gate stacks and planarizing the first oxide layer;

(c) forming first cell pads connected to the source regions and second cell pads connected to the drain regions in the first oxide layer;

5 (d) forming a second oxide layer on the first oxide layer and the first and second cell pads;

(e) sequentially stacking an etch stopper and a third oxide layer on the second oxide layer;

10 (f) forming oxide layer patterns to form damascene bit lines parallel to each other on the second oxide layer by etching the third oxide layer so that each of the oxide layer patterns has a first width;

(g) forming bit line contact holes through which the top surfaces of the second cell pads are exposed, by partially etching the etch stopper between the oxide layer patterns and the second oxide layer, and concurrently, etching upper parts of sidewalls of the oxide layer patterns on both sides of the bit line contact holes so that the oxide layer patterns have portions having a second width narrower than the first width;

15 (h) forming bit line contact plugs by filling the bit line contact holes with a first conductive material, forming damascene bit lines on the bit line contact plugs by filling lower parts of spaces between the oxide layer patterns with the first conductive material, and etching the oxide layer patterns over the bit lines so that only the portions of the oxide layer patterns having the first width protrude above the bit lines;

(i) covering the bit lines with a mask layer and planarizing the mask layer until the top surfaces of the oxide layer patterns remaining after (h) are exposed;

25 (j) selectively removing the remaining oxide layer patterns, the etch stopper under the remaining oxide layer patterns, and the second oxide layer with respect to the mask layer, thereby forming storage node contact holes; and

(k) forming storage node contact plugs by filling the storage node contact holes with a second conductive material.

30 10. The method of claim 9, wherein (h) comprises:

depositing the first conductive material to fill the bit line contact holes and spaces between the oxide layer patterns; and

forming the bit lines by recessing the first conductive material from the oxide layer patterns, and concurrently performing an etch-back process on the resultant structure on

which the first conductive material is deposited so that only the portions of the oxide layer patterns having the first width protrude above the bit lines.

11. The method of claim 9, wherein (h) comprises:

5 depositing the first conductive material to fill the bit line contact holes and spaces between the oxide layer patterns;

forming the bit lines by recessing the first conductive material from the oxide layer patterns, and concurrently performing an etch-back process on the resultant structure on which the first conductive material is deposited so that the overall width of the oxide layer patterns protruding above the bit lines is reduced; and

10 etching the oxide layer patterns having a reduced width so that only the portions of the oxide layer patterns having the first width protrude above the bit lines.

12. The method of claim 11, wherein etching the oxide layer patterns

15 having a reduced width is performed using dry etching, wet etching, or plasma etching.

13. The method of claim 9, wherein the mask layer is formed of a material having an etch selectivity with respect to those of the third oxide layer and the second oxide layer.

20 14. The method of claim 13, wherein the mask layer is formed of a nitride layer or an oxynitride layer.

25 15. The method of claim 9, wherein planarizing the mask layer is performed using an etch-back or a chemical mechanical polishing (CMP) process.

16. The method of claim 9, wherein the thickness of the third oxide layer is about 500 to about 6000 Å.

30 17. The method of claim 9, wherein the thickness of the etch stopper is about 10 to about 500 Å.